



# NOTES AND NEWS

## DISTRIBUTION OF *LITHODES CONFUNDENS* MACPHERSON, 1988 (DECAPODA, ANOMURA) ALONG THE ATLANTIC CONTINENTAL SHELF OF SOUTHERN SOUTH AMERICA

BY

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### INTRODUCTION

In southern South America, eleven species of lithodids are present on the Atlantic side south of 30°S, mainly associated to the continental shelf or the shelf break: *Neolithodes diomedae* (Benedict, 1894), *Paralomis granulosa* (Jaquinot, 1847), *P. spinosissima* Birstein & Vinogradov, 1972, *P. anameræ* Macpherson, 1988, *P. birsteini* Macpherson, 1988, *P. longidactyla* Birstein & Vinogradov, 1972 and *P. shinkaimaruae* Takeda, 1984, and *Lithodes santolla* (Molina, 1782), *L. turkayi* Macpherson, 1988, *L. ferox* Filhol, 1885 and *L. confundens* Macpherson, 1988 (cf. Macpherson, 1988; Spivak, 1997), respectively. Some lithodid crabs constitute profitable fisheries along both the Atlantic and Pacific sides. Currently, *L. santolla* and *P. granulosa* sustain commercial exploitation in Chile and Argentina (Lovrich & Tapella, in press). A third species, *L. confundens*, has been fished for a few years during the 1990s off the Atlantic coast of Tierra del Fuego, but was erroneously identified as *L. santolla* (cf. Lovrich et al., 2002). The geographic distribution of *L. santolla* and *P. granulosa* is well known, especially from the development of their fisheries near the landing ports where they are abundant. High concentrations of these species mainly occur in the Straits of Magellan and the southern Chilean fjords (with landings at Punta Arenas and Puerto Natales), the Beagle Channel (Ushuaia and Puerto Williams) and Golfo San Jorge (Comodoro Rivadavia) (fig. 1).

*L. confundens* is morphologically similar to *L. santolla* and confusion in specific determination is frequent. *L. confundens* was erected as a species from nine

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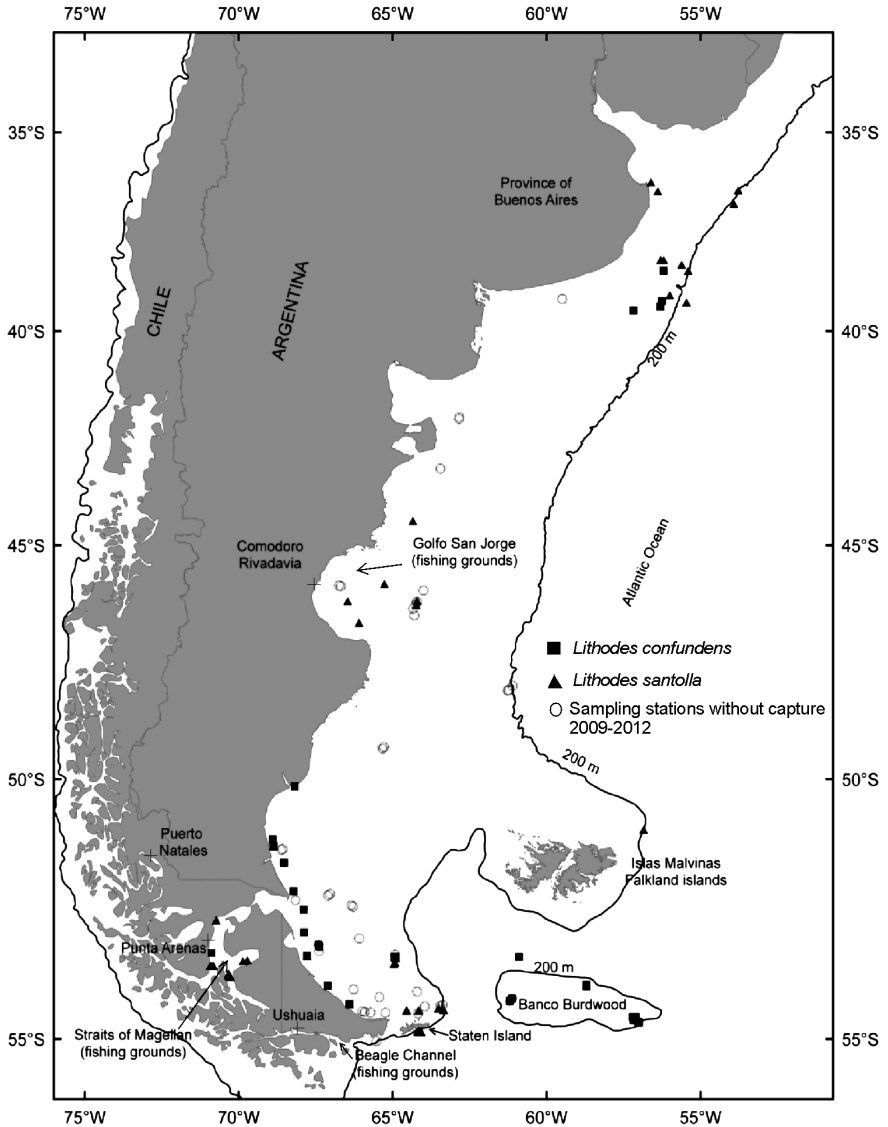


Fig. 1. Distribution of *Lithodes santolla* (Molina, 1782) and *Lithodes confundens* Macpherson, 1988 on the Argentine continental shelf.

individuals in a major revision of the Lithodidae by Macpherson (1988) and very few new records were reported since. Macpherson (1988) identified and distinguished *L. confundens* from *L. santolla* on the basis of its pattern of carapace spinulation.

During summer spring tides, the reproductive fraction of a *L. confundens* population occurs in the intertidal 100 km north of the eastern entrance of the

Straits of Magellan (Vinuesa et al., 1999; Lovrich et al., 2002). From the revision of old fishing records, Lovrich et al. (2002) postulated that on the Atlantic coast, *L. confundens* is distributed in coastal waters between 49°15'S and 54°30'S and on the Burdwood Bank. Since there is no *L. santolla* occurring within the geographic range of *L. confundens*, it has been hypothesized that *L. santolla* has a disjunct distribution: in the Beagle Channel and Golfo San Jorge. Nevertheless, the lack of proper surveys off the South American Atlantic coast between 48°S and 55°S precludes proper determination of the exact range of distribution of these morphologically similar species. Since both species are commercially exploited, knowledge on their distribution is a key prerequisite for the fishery management.

In this contribution we report upon the records of *L. confundens* on the continental shelf south of 36°S, based on the recent surveys by the RV "Puerto Deseado" and museum material.

#### MATERIAL AND METHODS

Samples were taken with shrimp bottom trawls in December 2009 and in March 2012. In the 2009 survey, the trawl had a 6 m of mouth opening and a 50 mm mesh size while in March 2012 the trawl had a 1.8 m of mouth opening and a 10 mm mesh size. Trawling was performed between 30 and 140 m depth during 20-40 min. All specimens captured were sexed and their carapace length measured to the nearest millimetre from the orbit to the midpoint of the posterior carapace. Additionally, the collection of lithodids of the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" was revised and specimens sexed and measured. Further occurrence data ( $n = 32$ ) were obtained from the GBIF database (GBIF data portal, GBIF, 2012).

#### RESULTS

##### ***Lithodes confundens* Macpherson, 1988**

##### ***Lithodes santolla* (Molina, 1782)**

All specimens examined from the Museo Argentino de Ciencias Naturales "Bernardino Rivadavia" were originally identified in the collection as *L. santolla* or, as formerly known, *L. antarcticus*. After revision, sixteen specimens were reclassified as *L. confundens* (table I).

Bottom trawls captured a total of 159 individuals of *L. confundens*, which mainly occur on the Atlantic coast off southern Patagonia, near the eastern entrance of the Straits of Magellan and on the Burdwood Bank (fig. 1). Along the Atlantic coast, *L. confundens* was found between 49-60 and 27-47 m depth in the 2009

TABLE I

Revised material from the Museo de Ciencias Naturales "Bernardino Rivadavia", Buenos Aires, Argentina

Catalogue number	Latitude (S)	Longitude (W)	Depth (m)	Sex	CL (mm)
12712	53°09'	70°46'		♀	41.6
15674	40°03'	57°		♀	8.0
15674	40°03'	57°		♀	22.1
15674	40°03'	57°		♂	9.1
15674	40°03'	57°		♂	33.5
16269	38°52'	56°20'	90	♀	55.0
16784	n.d.	n.d.		♀	42.2
17804	39°26'	56°25'		♀	30.0
21730	39°50'	57°18'	96	♂	51.8
24063	52°22'	68°22'	18	♂	49.3
24622	36°29'	56°07'		♀	35.5
24622	36°29'	56°07'		♀	39.7
25563	n.d.	n.d.		♂	29.4
25751	53°48'	60°09'	150	♀	56.3
25751	53°48'	60°09'	150	♀	62.8
25751	53°48'	60°09'	150	♂	63.7

Each specimen was originally *Lithodes santolla* (Molina, 1782) and here reclassified as *Lithodes confundens* Macpherson, 1988. n.d.: no data.

and 2012 surveys, respectively. In particular on the Burdwood Bank, individuals were found between 100 and 132 m depth (2009). Sex proportions on both the Atlantic coast and the Burdwood Bank were near 1 : 1 (Chi square for equality of proportions  $P < 0.05$ ). Modal sizes of *L. confundens* from the Atlantic coast were 120 and 125 mm CL for males and 90 and 80 mm CL for females, in 2009 and 2012, respectively (table II). On the Burdwood Bank only juvenile individuals of both sexes of about 25-35 mm CL were captured by our trawls, similar to those found in 2002 by Lovrich et al. (2005). In December 2009 no female *L. confundens* carried eggs, whereas in 2012 eight out of twelve females were ovigerous.

*L. santolla* was captured mainly in the Golfo San Jorge at 100-104 m and 74-110 m depth in 2009 and 2012, respectively (fig. 1). Only a few animals (one male) were from a southern location at 63 m depth, at the north of Staten Island. In the Golfo San Jorge and during 2009 most animals were juvenile and the modal size for both males and females was 50 mm CL (table II). In 2012 females and males were 80 and 100 mm CL in modal size, respectively. Twenty-three out of 36 females were ovigerous.

TABLE II

Mean size (in mm carapace length, CL) of specimens captured in the 2009 and 2012 surveys, according to species, sex and area. TDF, Atlantic coast south of 50°S; GSJ, Golfo San Jorge

Survey	Area	Species	Number of specimens	Sex	Mean size (size range)
RV "Puerto Deseado" 2009	TDF	<i>Lithodes confundens</i>	51	♀	87.2 (65.5-112.4)
			47	♂	106.9 (34.1-138.3)
	GSJ	<i>Lithodes santolla</i>	53	♀	54.2 (21.9-91.0)
			83	♂	72.4 (19.4-139.4)
RV "Puerto Deseado" 2012	TDF	<i>Lithodes confundens</i>	12	♀	69.2 (10.8-98.3)
			34	♂	115.7 (69.1-148.1)
	GSJ	<i>Lithodes santolla</i>	36	♀	79.5 (45.8-106.5)
			30	♂	91.8 (43.6-133.5)

## DISCUSSION

The two lithodids here reported are spatially segregated on most of the Atlantic continental shelf off southern South America. At the southern limit of distribution of *Lithodes* spp., only *Lithodes santolla* occurs in the Beagle Channel and the surroundings of Staten Island. In the Argentine sector of the Beagle Channel, the fishing activity and constant monitoring of this fishery would have allowed the detection and reporting of any new species among captured lithodids (e.g., Vinuesa et al., 1999).

Off the Atlantic coast of southern Patagonia between 48°S and 54°S, *L. confundens* is present mainly in the productive waters of the tidal frontal zone (Acha et al., 2004), and the few records of *L. santolla* at this latitudinal range are offshore, one of them at the continental shelf-break. The coastal occurrence of *L. confundens* is supported by its high frequency of occurrence in trawls near the coast compared to its absence from samples taken offshore. Noteworthy are the several records of *L. confundens* on the Burdwood Bank. Its presence at this location may be explained as a relict coastal fauna from times when the Burdwood Bank was an island or a very shallow environment. This palaeo-island was postulated to have existed until 22 000 years before present, coinciding with glacial maxima (Ponce et al., 2011).

Records of *L. confundens* near the eastern entrance of the Straits of Magellan confirm the presence of a reproductively active population. Both in the previous and present surveys, juveniles, ovigerous females and mating couples were found in the area (Lovrich et al., 2002). One of the nine specimens used by Macpherson (1988) for describing *L. confundens* originated from Punta Arenas-Straits of Magellan and there are no further records of this species here or on the Pacific side of South America. Nevertheless, the presence of *L. confundens* in the Straits of Magellan is plausible and specimens from this area deserve more attention as

regards the time of specific determination. This would be feasible since a fishery for *L. santolla* has developed in the Straits of Magellan and adjacent fjords since the 1930s and is still ongoing (Lovrich & Tapella, in press). Further north, in the Golfo San Jorge, again only *L. santolla* occurs in high numbers and supports a profitable fishery with landings of 2500 ton per year. At this location there are no records of *L. confundens*.

At the northern limit of their distribution, off the Province of Buenos Aires, both species *Lithodes santolla* and *L. confundens* co-occur in the same area. The presence of *L. confundens* at a latitude of ca. 38°S as revealed by the museum material, expands its geographical distribution to the northern limit of the Magellanic biogeographical province (Balech & Ehrlich, 2008). The presence of *L. santolla* at latitudes as far north as 36°S was previously known (Boschi, 2000) following the subantarctic waters that run along the shelf break and sink at the Brazil/Malvinas confluence (Acha et al., 2004). The occurrence of both species at these latitudes is interesting from the biogeographical point of view because this is the only area where they co-occur. Larval dispersal from southern waters is unlikely, since larvae are lecithotrophic with limited swimming ability and epibenthic, associated to complex substrates (Tapella et al., 2012). Distribution of these lithodids is possible by adult migration (Thatje et al., 2005) and, hence, a continuous occurrence along the continental shelf increasing in depth with decreasing latitude should be expected between 37°S and 45°S. However, the present records for both species indicate disjunct distributions (i) for *L. santolla* in three different areas: Beagle Channel/Staten Island, Golfo San Jorge and off the Province of Buenos Aires and (ii) for *L. confundens* at the eastern entrance of the Straits of Magellan and Burdwood Bank, and the Province of Buenos Aires. In order to assess the exact distribution of both *L. santolla* and *L. confundens*, more sampling effort is required into parts of the south-western Atlantic continental shelf, where fisheries do not operate and for which no or little distributional data are available. On the fishery grounds, an improved identification of the lithodids captured should enhance our understanding of the exact distribution boundaries of the species, and help to identify areas where both species co-occur.

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